THURSDAY, AUGUST 19, 1909.

OILS, FATS, AND WAXES.

Chemical Technology and Analysis of Oils, Fats, and Waxes. By Dr. J. Lewkowitsch. Fourth edition, entirely re-written and enlarged. 3 vols. Vol. i., pp. xx+542; vol. ii., pp. xi+816; vol. iii., pp. viii +406. (London: Macmillan and Co., Ltd., 1909.) Price *2l.* 10*s.*

THE third edition of this work was reviewed in these columns about five years ago (vol. lxx., p. 502). It is therefore unnecessary again to describe the plan of the book in any detail. In the broad outlines it remains unaltered, though there are changes in the arrangement, and considerable additions.

Much has been done, and much written, in this branch of technology since 1904; wherefore the author has found it necessary to expand the work into three volumes. Broadly speaking, the first volume describes the general chemical constitution of oils, fats, and waxes, and the usual physical and chemical methods adopted in examining them; vol. ii. treats of the individual natural products; and the third volume is devoted to the various groups of manufactured articles, such as edible oils, oxidised oils, candles, soaps, and glycerin. Some new sections, dealing with emulsified oils, the fatty-acid industry, and wax technology, have been added to this part of the work; and more space than formerly has been allotted to the description of manufacturing operations.

Apparently no pains have been spared in making the book as complete and as modern as possible. So far as the reviewer can judge by testing the information here and there, no recent work of importance on the theoretical and scientific side has been overlooked. Thus Bömer's process for the identification of pure glycerides is summarised, and a description is given of the "direct" method for isolating and determining glycerol recently proposed by Shukoff and Schestakoff. Valenta's suggested method of quantitatively separating aromatic hydrocarbon oils from those of the aliphatic series by extraction with dimethylsulphate is dealt with at some length; and an account is also given of the criticisms of the process by subsequent workers.

On the technological side an interesting development is mentioned which may prove of some importance in the candle industry. A large quantity of liquid oleic acid occurs as a by-product, and one of the standing problems of the industry has been to find some mode of converting this liquid acid into its solid homologue, stearic acid, thereby rendering it available as a material for candle-making. Many suggestions have been made, and many patents obtained, with this object in view; but no great success has hitherto attended these efforts—at least, on a manufacturing scale. It seems, however, that an application of Sabatier and Senderens' classical researches upon the "reduction" of organic compounds by means of finely-divided nickel may mark a new stage in the matter. Several investigators have proposed such an application, and Dr. Lewkowitsch states that, by a systematic study of the Sabatier and Senderens reaction, he has recently succeeded in converting oleic acid into practically the full quantity of stearic acid theoretically obtainable from it. What, however, is not quite clear is whether the translation from laboratory experiments to factory practice has been successfully accomplished. Details are withheld.

The author gives a tabulation of oils, fats, and waxes based upon the magnitude of the iodine values. He looks upon this as the most convenient classification for practical purposes. Probably it is; but there are, as would be expected, some inconsistencies and overlapping of groups in this arrangement. Thus certain of the non-drying oils have a greater iodine value than some of the drying and semi-drying oils. But as every chemist dealing with diverse varieties of oils and fats probably constructs some such table for himself, it will be useful to have a fairly complete tabulation of critically-selected values for general reference, even though it is not an ideal basis of classification.

Turning for a moment to commercial matters, most people know that we import large quantities of butter into this country, but many may be surprised to learn that lard is imported to the value, roughly, of five millions annually, and another million pounds' worth, our author calculates, is made at home. The section of the book devoted to this important fat has been increased considerably. Some of the statements made in the earlier editions have had to be modified —notably as regards the range of iodine values—but this was only to be expected, in view of altered circumstances of production. The author discusses at some length the difficult problem of detecting small admixtures of beef-fat with lard. Tables are quoted showing the melting-points of the crystals which deposit from solutions in ether of lard and beef-fat, respectively. The beef-fat crystals have much the lower melting-point. It seems, however, to have escaped the author's notice that the crystals obtained from a mixture of beef-fat and lard have also a lower melting-point than those from lard alone. Used with discretion, such as the author wisely inculcates in other matters, the importance of this fact in solving the problem is obvious.

In dealing with the adulteration of butter the author stigmatises as futile the attempt to prove "that an admixture of beef-fat or lard has taken place if only low titration-numbers for the insoluble volatile acids are found." Undoubtedly such an attempt is futile. It is so obviously futile as to raise a shrewd suspicion that there has been a misunderstanding somewhere.

In some minor matters we do not always see eye to eye with the author. For example, he unduly minimises the value of the specific gravity indications in the examination of butter-fat. His objection is that the test "would hardly lead to the detection of smaller quantities of an adulterant than 30 per cent." In a sense, that is true; but it is also true, in a

© 1909 Nature Publishing Group

sense, of every other single criterion which could be applied.

These, however, are small points. Summing up one's impressions of the book as a whole, they are that it well maintains its place in the front rank of works devoted to the study of oils, fats, and waxes. To the chemical technologist it is practically indispensable.

C. SIMMONDS.

A CYTOLOGICAL TREATISE.

Plasma und Zelle. Erster Abtheilung. By Prof. Martin Heidenhain. Erste Lieferung, Die Grundlagen des mikroscopischen Anatomie, die Kerne, die Centren, und die Granulalehre. Pp. viii+506. (Jena: Gustav Fischer, 1907.) Price 20 marks.

THIS somewhat bulky volume is the first instalment of Prof. Martin Heidenhain's treatise on "Plasma und Zelle" which is to form a part of Bardeleben's great work on human anatomy.

The method which the author has adopted is perhaps not the ideal one, but it must be remembered that the science of cytology is young, and its vigorous development has manifested itself in the growth of an enormous amount of details which some day will become connected up so as to make a coherent organism, despite the fact that at the present time the different sections seem to be somewhat isolated. The features which in one group appear to be of fundamental importance may elude recognition in, and perhaps be really absent from, others; and thus that logical connection so dear to the minds of many is difficult, and at present often impossible, to trace. Probably for some time to come the trees will be more apparent than the wood. Prof. Heidenhain has chiefly worked on the cells of a few vertebrate animals, and it must be confessed that throughout the somewhat lengthy treatment of his subject this point of view is rather strongly reflected. There is hypothesis in plenty, together with much really acute analysis, but one cannot repress the feeling that the chastening influence of the protozoan nucleus is rather conspicuous by its absence.

The treatment is frankly morphological, and upon a somewhat narrow range of very detailed observation of comparatively few forms a theoretical superstructure of doubtful stability has been erected. Some cytologists, at any rate, will criticise one of the earlier pronouncements (p. 3) in the book, to the effect that discussion (Erörterung) of biochemical structure forms no part of the province of scientific morphology, and that the latter must take the former as granted. Surely the trend of modern morphology is in the direction of discontent with such a position. Some of us, at any rate, believe that form and structure are merely the expression of biochemical constitution, and it is just this latter problem that we want to attack.

Prof. Heidenhain postulates "units of living substance" as the essential elements of an organism. The cells are regarded as a special case of the aggregation of these living units. In this he is practically following those who regard the cell as by no means the real unit of the organism, and unquestionably this is a tenable position; but, nevertheless, the cell, despite its complex organisation, represents actually the lowest rank in the polity of the multicellular organism out of which the organism itself is built up; nor is the case really different in syncytial bodies. The quarrel with the cell from this point of view is perhaps partly due to the fact that we have not been clear as to what we mean by an organism. A human society is made up of the individuals which compose it; we are justified in regarding them as the ultimate constituents of such a social organism and we cannot usefully push our analysis further back, for they form the lowest units which propagate themselves and differentiate into the complex structure of which the society is composed. Of course, we are aware that each one can be resolved still further into tissues and cells, but these things do not come into the scheme of the social organism as such. The same holds good when we get still lower in the scale. The cells plainly continue to be the units of which the *corpus* is built up—until we get to the unicellular organisms. In the latter we find a more elaborate differentiation than is characteristic of the metazoan or metaphytan cell, but in essentials it seems to be the same. The protoplasm and the nucleus still are requisite to maintain it as a going concern, and reproduction by fission or otherwise is always connected with the distribution of a combination of both to each of the offspring. This is strikingly shown in some forms in which a nucleus as such is perhaps absent, and only the stuff of which the nucleus is made is present in a more or less distributed condition in the cell.

But although we may not agree with the author in his belittlement of the cell, many will assent to his conclusion that it has been made too prominent as the "be all and end all" of the living body. The organism is higher than its parts, and itself determines what form it shall take—or, to put it more plainly, the reactions that are due to the relations subsisting between one part of the organism and another, or between it and its environment, are of such a kind as to influence the fashion of development of the new cells and new tissues.

Prof. Heidenhain's position with regard to the cell is clearly stated on p. 81, where he says that

> "it is not the cell which is the bearer of life, but life is inherent in every living particle, down to the smallest molecular group which can be called alive. The cell is rather only a special apparatus which itself is made up of living material."

The crux of the matter obviously lies in the meaning we attach to the word "living."

Many pages are devoted to cell organs, such as centrosomes, and to a very lengthy discussion of Altmann's so-called "granular theory." We confess that much of the space thus allocated seems to us to be hardly well utilised; and although it is not fair finally to criticise a work of which only the first part has appeared, it appears to us that a more real service to cytology would have been rendered if Prof. Heidenhain had focussed the information which is so rapidly accumulating as the result of the study of the lower forms of life upon the problems presented by the higher types.

© 1909 Nature Publishing Group